Peyronie’s Disease in Teenagers

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ABSTRACT

Introduction. Peyronie’s disease (PD) is commonly seen in middle-aged men, and little is known about this condition in teenagers.

Aim. To investigate the characteristics of PD in teenagers.

Methods. The findings were compared between patients with the disease who were teenagers with those over 40 years of age. Statistical analyses were conducted to define differentiating features between these two groups.

Main Outcome Measures. The demographics, clinical features, and associated comorbidities of patients with PD were reviewed.

Results. Thirty-two teenaged males were evaluated for PD in a single institution over a 10-year period. The median age for our cohort was 18 (15–19) years. Forty-five percent of patients had already been seen by another urologist, and 28% had been told they did not have PD. The mean duration of PD before seeking medical care in our cohort was 3 ± 1 months. Sixteen percent of patients reported antecedent penile trauma, half of which happened during coitus or masturbation, and 18% of patients had hemoglobin (Hb) A1c levels > 5%. Dupuytren’s contracture was not seen in this population. Twenty-two percent of patients presented with penile pain. Subsequent ED was seen in 37% of patients. Multiple noncontiguous plaques were seen in 37% of patients. Twelve percent were previously treated with vitamin E, while another 12% had previous intralesional verapamil. High distress was reported by 94% of patients. Thirty-four percent sought medical attention for anxiety/mood disorder, and 28% had a negative encounter with a sexual partner related to PD. All of the 32 patients had penile curvature with a mean of 32 ± 12 degrees. Seventy-two percent of the patients had dorsal curvature while 22% had an associated deformity. Using duplex Doppler ultrasound, 12% had a calcified plaque, while none of the patients had abnormal hemodynamics. When compared with PD in adults, teenagers had greater than seven times the prevalence of multiple noncontiguous plaques (37% vs. 5%). Also, the prevalence of HbA1c level > 5% was higher in the teenagers as well (18% vs. 5%).


Key Words. Peyronie’s Disease; Peyronie’s Plaques; Teenagers; Clinical Characteristics
hemodynamic testing in teenagers with erectile dysfunction (ED), but did not look at PD or other sexual dysfunctions in teenagers. Although PD characteristics have been studied and described in older men, they cannot be assumed to be similar in teenagers, as their sexual activity patterns differ considerably. PD is well recognized as a cause of distress and depression [7]. It has also been established as a substantial cause of ED [8,9]. ED is an age-related condition with a known prevalence of 1–12% among men in the third decade of their life [10]. Additionally, ED is associated with a significant reduction in quality of life (QOL) [11]. PD and its association with ED are projected to have a substantial psychological impact in teenagers as they reach sexual maturity and begin sexual activity. Moreover, PD may become a persistent problem with ongoing psychological consequences inside and outside of the sexual health arena. In a natural history study of PD patients, only 12% of men had spontaneous recovery, while approximately 40% remained stable and as many as 48% of men saw their condition worsen over time [12].

While PD has been extensively studied in older men, there is no data in the literature to describe the characteristics of PD and its associated distress in teenagers. There are no specific recommendations for evaluating and treating PD in teenagers. The extent of evaluation of teenagers presenting with a penile curvature varies greatly and is commonly approached with minimal evaluation and often dismissed as congenital deviation of the penis solely based on age. As a result, treatment consists predominantly of reassurance. In the current study we summarize a 10-year experience with the evaluation of teenagers with PD at a tertiary referral for sexual medicine, compare our findings in the teenage population to older men treated at the same sexual medicine center, and comprehensively describe the unique characteristics of PD in teenagers, to aid clinicians in evaluation and treatment of teenagers with PD.

Methods

Patient Population
This analysis is based upon a review of a prospectively constructed departmental database of all subjects presenting with PD to a sexual medicine clinic. With Institutional Review Board approval, we retrospectively analyzed this database for males ≤19 years of age who presented for evaluation between 2000 and 2009. Review included identification and characterization of teenagers with PD looking at demographic characteristics and medical data. Data included comorbidities and potential PD risk factors, duration of PD at time of presentation, symptomatology, and prior therapies. Lastly, all patients were examined to define PD plaque characteristics. Patients were asked “yes/no” questions regarding whether they experienced a high level of distress, had prior consultation for depression or anxiety, and whether any negative sexual encounters had occurred with a partner related to the presence of PD.

Deformity Assessment
All patients complaining of penile deformity underwent evaluation that included deformity assessment at maximum erectile rigidity and a Doppler ultrasound (DUS) hemodynamic study using a redosing schedule. All hemodynamic studies used a vasoactive agent given 15 minutes before the assessment (Trimix, 0.05 mL; Bryce Pharmaceuticals, Stamford, CT, USA) with up to three doses administered, if a fully rigid erection was not achieved (redosing schedule). Variables measured by the ultrasound included arterial peak systolic velocity (PSV), end-diastolic velocity (EDV), and resistive index (RI), plaque morphology, and calcification status. A PSV of <30 cm/second indicated impaired arterial inflow, and an EDV of >5 cm/second or RI < 0.9 indicated venous leak.

Statistics
All statistical analyses were performed using SPSS for Windows, 10.1 (SPSS Inc., Chicago, IL, USA). The teenagers’ data were compared with the older PD population (aged > 40 years) using Chi square analysis. This analysis specifically focused on, among other factors, the prevalence of multiple plaques, penile angulation, hemoglobin (Hb) A1c levels, and the time to presentation for evaluation. Descriptive analyses of the results included frequencies for discrete variables and the mean (standard deviation and range) for continuous variables.

Results
A total of 32 teenage males were evaluated for PD in a single institution over a 10-year period. This represents 2.5% of all PD patients in our database. A total of 1,050 patients within the database were 40 years of age or older. All patients were self-referred via internet search. The median age for our cohort was 18 years (range 15–19). Forty-five percent of patients had already been seen by
has not been studied in teenagers. The prevalence of teenagers in our database with PD was 2.5%. The prevalence of young men (<40 years old) presenting with PD has been reported to be between 1.5% and 9.9% [2,5,13,14]. Young men often go undiagnosed or misdiagnosed. Many of the patients in our study had already seen other physicians, some being diagnosed with congenital penile deviation (CPD). Reasons for this include unawareness that PD exists in very young subjects and lack of proper evaluation. The implications of incorrect diagnosis will obscure prognosis and treatment outcomes.

Based on our experience, teenagers with PD seek medical knowledge and treatment without delay. There was a relatively short lag time from the onset of PD to comprehensive evaluation and treatment (mean 3 ± 1 months). This important finding is not in agreement with a previously published study by Heruti et al. that demonstrated that young men with sexual dysfunction tend to present late, and only a minority of young men seek early evaluation and treatment [15]. This significant discrepancy may stem from patient population differences; while the study by Heruti et al. included an unselected population, the population in the present study was composed of highly motivated subjects who actively sought superior medical care at a tertiary referral center. In accordance with our results, a study of 19 young men (under the age of 40) with PD, the median time to presentation was 3 months [13].

Correct diagnosis of PD is based upon clinical assessment in which emphasis should be on history details such as the duration of disease, physical examination, e.g., palpable penile plaques, and advanced assessment that consists of penile morphologic assessment during erection and DUS. The purpose of this extensive evaluation, especially in young subjects, is to differentiate PD from a congenital etiology of penile curvature. These two conditions have different pathogenesis, epidemiology, clinical course, and treatment. Congenital penile malformation is believed to be secondary

<table>
<thead>
<tr>
<th>Table 1</th>
<th>PD evaluation in the erect state</th>
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<tbody>
<tr>
<td><strong>Visual inspection data</strong></td>
<td></td>
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<tr>
<td>Penile curvature</td>
<td>100%</td>
</tr>
<tr>
<td>Curvature magnitude (Mean ± SD)</td>
<td>32 ± 12%</td>
</tr>
<tr>
<td>Dorsal curvature</td>
<td>72%</td>
</tr>
<tr>
<td>Other deformity</td>
<td>22%</td>
</tr>
<tr>
<td><strong>Doppler US data</strong></td>
<td></td>
</tr>
<tr>
<td>Sonographically proven calcified plaque</td>
<td>11%</td>
</tr>
<tr>
<td>PSV (Mean ± SD)</td>
<td>62 ± 28 cm/second</td>
</tr>
<tr>
<td>EDV (Mean ± SD)</td>
<td>1.6 ± 0.8 cm/second</td>
</tr>
<tr>
<td>RI (Mean ± SD)</td>
<td>0.98 ± 0.16</td>
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PD = Peyronie’s disease; SD = standard deviation; PSV = peak systolic velocity; EDV = end-diastolic velocity; RI = resistive index.

### Discussion

PD is believed to be a disease affecting older men. Although well defined in the adult literature, PD another urologist, and 28% had been told they did not have PD. The mean duration of PD before seeking medical care in our cohort was 3 ± 1 months. The prevalence of comorbidities and possibly related risk factors included penile trauma (16%), half of which happened during coitus or masturbation and HbA1c levels > 5% (18%). There were no patients with Dupuytren’s contracture. Twenty-two percent of patients presented with penile pain. Subsequent ED was seen in 37% of patients. Multiple noncontiguous plaques were seen in 37% of patients. Four patients (12%) had tried vitamin E, while another four patients (12%) had tried intraslesional verapamil prior to their visit to our center. In terms of anxiety and stress, 30/32 (94%) patients reported high distress, 34% sought medical attention for anxiety/mood disorder, and 28% had a negative encounter with a sexual partner related to PD.

All of the 32 patients had penile curvature with a mean of 32 ± 12 degrees. Seventy-two percent of patients had dorsal curvature, while 22% had an associated deformity (indentations, hour-glass deformity). Using a DUS, four patients (11%) had a calcified plaque. No patient had abnormal hemodynamics; with a mean PSV of 62 ± 28 cm/second, a mean EDV of 1.6 ± 0.8 cm/second, and a RI of 0.98 ± 0.16 (Table 1).

When compared with PD in adults, teenagers had seven times the prevalence of multiple noncontiguous plaques (37% vs. 5%, \( P = 0.02 \)). Also, the prevalence of an HbA1c level > 5% was higher in the teenagers as well (18% vs. 5%, \( P = 0.015 \)). The majority of teenagers (87%) presented within 6 months, while a minority of adults (28%) presented during that same time period, \( P < 0.01 \) (Table 2).

**Table 2** Comparison of PD characteristics

<table>
<thead>
<tr>
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<th>Adults (%)</th>
<th>Teenagers (%)</th>
<th>( P ) value</th>
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<tbody>
<tr>
<td>Multiple (noncontiguous) plaques</td>
<td>5</td>
<td>37</td>
<td>0.02</td>
</tr>
<tr>
<td>HbA1c &gt; 5%</td>
<td>5</td>
<td>18</td>
<td>0.015</td>
</tr>
<tr>
<td>Present for evaluation within 6 months</td>
<td>28</td>
<td>87</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

PD = Peyronie’s disease; HbA1c = hemoglobin A1c.
to disproportional development of the corpora cavernosa. As this condition requires erections for its diagnosis, unlike other congenital malformations, it is not evident at birth or in childhood, and often it is underdiagnosed [16]. A single study in the medical literature, from Israel, made an attempt to elucidate the incidence of CPD; Yachia et al. estimated the incidence of CPD in newborns using a proprietary vacuum erection device with induction of artificial erection and found it to be 0.6% [17]. While CPD is a stable condition characterized by penile deviation only, PD is an acquired disorder of the tunica albuginea, characterized by a progressive formation of a plaque of fibrous tissue and often accompanied by penile pain and deformity on erection [18]. The disease has an early phase marked by pain in the flaccid and/or the erect state with plaque tenderness. This phase can last up to 12–18 months, but its duration is variable. The late or stable phase of PD is characterized by absence of pain and a stable penile deformity upon erection [10]. Sonographically, CPD is characterized by normal-appearing penis, while PD is characterized by tunical-thickening irregularities and calcification, and demonstrable calcified PD plaques. While surgical intervention for CPD is indicated whenever a patient desires, PD patients should undergo surgical intervention only when the disease is in the stable phase [19].

Differentiating the etiologies will shape prognosis and realistic expectations with treatment. In a study by Rehman et al., 32 patients underwent modified plication repair of curvature secondary to PD (26) or CPD (6). Plication for congenital deviation (6 patients) resulted in 100% satisfaction with the surgical result. Of the 26 men with PD, 19 (78%) reported a good to excellent outcome. Six of 32 patients, all with PD, were unable to resume satisfactory coitus with a postoperative straight penis [20]. These results are confirmed in other studies showing the high efficacy of surgery in the correction penile angulation, although results are superior with CPD [21].

The underlying etiology and risk factors associated with adolescent PD have not been studied previously. Thirty-seven percent of teenagers in this cohort had penile plaques compared with 5% of men over the age of 40 in the same database. The high prevalence of plaques present in the younger population may help aid in the diagnosis of PD. Although no clear etiology has been elucidated, it is interesting to us that an HbA1c level > 5% was present in a surprisingly high number, indeed, 18% of teenagers, almost four times greater than in adults with PD (5%). In a study by Deveci et al. comparing men less than 40 years of age with those over 40 years, DM was noted in 50% and 18%, respectively [22]. On multivariate analysis, patients with PD at a young age had twice the likelihood of having diabetes. In another study of men with PD under 40 years of age, 21% of patients had diagnosed diabetes [13]. In contrast, other studies have found no increased incidence of diabetes in patients with PD [4,5]. In our study, a portion (16%) of teenagers reported antecedent trauma prior to presentation. Trauma history in the Deveci study was comparable to our data for men less than 40 years of age (18%), substantially greater than men over 40 years of age (5%).

In the present study, only 12% of the patients had tried vitamin E, while another 12% had been treated with intraliesional verapamil. These percentages are small, compared with the adult literature, possibly due to the young age of our patients, increasing number of treatment options currently available as well as young motivated men actively seeking updated evidence-based information about the efficacy of medical management. The lack of previous treatments provides an unscathed and authentic view of the course of PD in young men.

In a study by Mulhall et al. of 246 middle-aged men with PD followed for a mean of 14.5 months, 32% of adults had ED. In our study, 37% of patients reported subsequent ED [12]. In the Mulhall study, there was no statistically significant increase (38%) in ED over the course of a year. However, there was a significant increase in the number of men who had difficulty with penetration due to the abnormality during follow-up, an increase from 42% to 67%. In a study of men less than 40 years of age, 21% reported ED [13]. In that study, although some patients underwent medical and surgical treatments, at 2-year follow-up, 36.8% had improvement in penile deformity, 42.1% had stable disease, and 21% experienced deterioration of the penile curvature.

In the current study, 22% of the patients reported penile pain; in the Mulhall study, all patients reported improvements in pain, and 89% reported complete resolution of pain. In our study, the mean penile curvature was 32 ± 12 degrees, whereas the mean penile curvature in the adult population was 42 ± 22 degrees, perhaps indicative of the early time frame to initial evaluation for the teenage group. Seventy-two percent of patients had dorsal curvature. This is similar to the

77% of patients in a literature review [14]. The clinical significance of this is unknown. A possible explanation is similar mechanisms of injury, e.g., trauma and intercourse. Interestingly in this group, more than a third (37%) reported ED onset after PD diagnosis, while the DUS indicated normal PSV and EDV values. This highlights that ED in young men with PD may be psychogenic, potentially originating from anxiety and subsequent adrenergic response. This stresses the likelihood of significant psychosomatic effects of PD on ED.

The psychological impact of PD in adolescents is currently unknown, but can be presumed to have at least as great a negative effect on QOL as it does in older men [23]. PD is well recognized as a cause of distress and depression, as well as ED. Men with PD reveal mood disturbances, low self-esteem, and emotional distress. They report feeling a loss of physical attractiveness and virility, as well as fear of partner sexual dissatisfaction [24]. PD is often a barrier to initiation of relationships. Moreover, PD patients may have poor body image leading to loss of intimacy in the relationship, relationship conflict, and depressive symptoms [25]. This study illustrates that PD and its association with ED has a substantial psychological impact on teenagers. We found a remarkable incidence (94%) of high distress level, some of which can be due to anticipated or actual negative sexual experiences. In our study, 28% of patients reported negative sexual experiences. In a study by Smith et al. of 245 men of various ages with known PD, emotional and relationship problems attributed to PD were observed in 81% and 54% of men, respectively. Moreover, the ability to have intercourse and having emotional problems are independent predictors of relationship problems [26]. Gelbard et al. studied the psychological effects of PD on 97 men of various ages via questionnaire [27]. He observed that the ability to have intercourse was unchanged in 40% of the patients throughout the disease process and worsened in 40% as well. Of the patients, 77% reported psychological effects due to PD, which improved eventually in 28%, did not change in 36%, and worsened in 36%. Of the patients who observed improvement in the psychological effects, 80% labeled the disease as one of resolution, whereas patients with no improvement in psychological effects did not categorize the disease as one of resolution. Unfortunately, psychological effects in the Gelbard study were listed as either absent or present, without stratifying each effect and quantifying its impact on the disease process with a validated measure.

In our study, 34% of the patients sought medical attention for anxiety or a mood disorder. Nelson et al. looked at depression and distress in males with PD using validated instruments including the Center for Epidemiological Studies Depression scale (CES-D) as well as the Mental Health Scale Short Form-36 (SF-36). The median duration of PD in 92 patients at presentation was 12 (1–360) months. Overall, 48% were classified as depressed on the CES-D (26% moderate, 21% severe). These results are supported by data from the Mental Health subscale (MHS) of the SF-36 (lower scores indicate lower mental health). For the entire sample, the MHS standardized mean of 46.8 was significantly lower ($P < 0.05$) than the general male population standardized mean of 50. Furthermore, the rate of depression in the general male population is considerably lower (12%) than the 48% of men in the Nelson study [28].

Medical therapies for ED associated with PD may improve a patient’s ability to have intercourse [29]. The ability to achieve an erection rigid enough for intercourse is a predictor of emotional and relationship problems in men with PD. Although currently we do not have prospective data on treatment outcomes of PD teenagers, in addition to medical and surgical treatments, we recommend that these patients should be referred for behavioral interventions to reduce the associated depression and anxiety. This may alleviate the negative psychological contribution of PD to body self-image and confidence and allow for improved sexual functioning.

To our knowledge, this is the first study addressing PD characteristics, risk factors, clinical manifestations, and psychological effects of PD in teenagers. Our study has strengths and limitations. A single physician (JPM), experienced in the evaluation and management of PD, evaluated all the patients. The study population was relatively small, and selection bias is present as the data was obtained from a tertiary referral center. Therefore, the true incidence of PD in teenagers cannot be determined. There is no validated assessment of anxiety or depression in the current study. PD can occur in the very young and may have a significant effect on patients’ QOL and well-being. The need for early evaluation is further supported by data published by the Centers for Disease Control and Prevention, reporting that half of all males of
high-school age have had sexual intercourse, and a third are sexually active on a regular basis [30].

Conclusions
PD occurs in teenagers, although the true prevalence cannot be determined. Young men with any sexual dysfunction should undergo complete evaluation. Teenagers were commonly misdiagnosed by urologists. History (duration), physical exam (penile palpation looking for plaques), inspection at the erect state (curvature nature and penile dimensions), and the DUS (calcified plaques, tunica PD characteristic alterations) can help to establish the correct diagnosis. The unique characteristics of PD in teenagers should be taken into consideration. These patients often present at an early stage in the disease process. Teenagers with PD are more likely to have elevated HbA1C and multiple noncontiguous plaques. The psychological effects associated with PD were significant, with a portion of patients seeking medical consultation for a mood disorder. A greater awareness of the occurrence of PD in teenagers, its psychological consequences, and a thorough evaluation of young men with symptoms suggestive of PD will lead to the correct diagnosis and management.

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Matthew Hall; John Mulhall

Category 3
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References


